1. (5%) How many different characters can be represented using 2 bytes of data?

   2 bytes = 16 bits
   \(2^{16} = 65,536\) different characters

2. (5%) Which Visual Basic number “type” would you use if you wanted a calculation that carried the maximum possible number of significant figures?

   DECIMAL

3. (10%) What is the value of variable \(i\) at the end of the following segment code?

   \[
   \text{Dim } i \text{ As Integer } = 3 \\
   \text{Dim } y \text{ As Integer } = 4 \\
   \text{Dim } z \text{ As Single } = 1.3 \\
   i = i / y + z * i
   \]

   Value of \(i\) after the last line executes: \(i = 5\)
4. (10%) What is the value of the variable $y$ at the end of the following segment code?

```vba
Dim x,y As Boolean
Dim a,b As Integer
y = True
a = 13 : b = 8
x = a > 2*b
y = Not (x Or a > b)
```

Value of $y$ after the last line executes: False

5. (10%) What is the value of $j$ after the last line of the code segment below executes?

```vba
Dim i As Integer = 3
Dim j As Integer = 5
If i > j Then
    i = j
Else if i > j mod i
    i = j ^ 2
Else
    i = i * j
Endif
```

Value of $i$ after the last line executes: $i = 25$

6. (10%) What is the value of Total after the last line of the code segment below executes?

```vba
Dim N, Total As Integer
Total = 0
For N = 5 To 2 Step -2
    Total = Total + 2 * N
Next N
MsgBox(Total)
```

Value of Total after the last line executes: Total = 16
7. (10%) Refer to the following code segment:

```vba
Dim A() As Integer = {1, 3, 2}
Dim B(3) As Integer
B = A
Msgbox(B(3))
```

What will happen when the last line of this code segment executes? Why?

Array out of bounds

8. (15%) Consider the following "Main" program and a function procedure "Prod":

```vba
Sub Main()
    Dim i, j As Short
    i = 3: j = 4
    i = Prod(i, j)
    MsgBox("i = " & i & " j= " & j)
End Sub

Function Prod(ByRef A As Short, ByRef B As Short) as Short
    B = Math.Min(A, B)
    Prod = A * B
End Sub
```

What is the value of $i$ printed by the "Msgbox" command when it executes? Why? What is the value of $j$ printed by the "Msgbox" command when it executes? Why?

$i = 9, j = 3$
9. (25%) You are asked to complete the following subroutine, so that a square array \( A \) of size \( L \times L \) is initialized when the routine is called with the following pattern:

\[
\begin{array}{ccccccc}
0 & 1 & 2 & 1 & 2 & 1 & \ldots \\
1 & 0 & 1 & 2 & 1 & 2 & \ldots \\
2 & 1 & 0 & 1 & 2 & 1 & \ldots \\
1 & 2 & 1 & 0 & 1 & 2 & \ldots \\
2 & 1 & 2 & 1 & 0 & 1 & \ldots \\
1 & 2 & 1 & 2 & 1 & 0 & \ldots \\
\ldots & \ldots & \ldots & \ldots \ldots & \ldots & \ldots & \ldots \\
\ldots & \ldots & \ldots & \ldots \ldots & \ldots & \ldots & \ldots \\
\ldots & \ldots & \ldots & \ldots \ldots & \ldots & \ldots & \ldots \\
\end{array}
\]

\[
A =
\]

```vbnet
Sub InitSquare(ByVal L As Integer, ByRef A() As Integer)
    ' write your code in the square box below
    Dim i, j As Integer
    For i = 0 To L - 1
        For j = 0 To L - 1
            If i = j Then
                A(i, j) = 0
            ElseIf (i + j) Mod 2 = 0 Then
                A(i, j) = 2
            Else
                A(i, j) = 1
            End If
        Next
    Next
End Sub
```